is a natural parent of gas engines, and it seems possible that some smokeless explosive might be used for driving motor-cars; for though the fuel would be heavy the mechanism might be simple, and the opportunity for varying the work done at each stroke very considerable, so that its adaptability to the circumstances of motor-car propulsion would be great.

The work is so full of interesting matter that it would be hopeless, in a short review, to call attention to the tenth part of its contents. Accounts of Egyptian, Greek, Roman and Alexandrian inventions are followed by accounts of those of the Byzantines, Arabians and of the Middle Ages. Science progressed slowly in these dark ages. Ten pages suffice for the whole of the inventions of Europe for this thousand years. While the energies of mankind were divided between fasting and praying for others, and fighting and preying on others, there was but little time or opportunity for the study of nature. With the sixteenth century the tide of evolution of the means of studying nature had begun strongly to flow. At first rising slowly it has in this last century come like the bore on the Amazon, almost overwhelming us with the rapidity of its development.

G. F. F. G.

OUR BOOK SHELF.

The Diseases of Children. By G. Elder and J. S. Fowler. Pp. xii + 391. (London: C. Griffin and Co., Ltd., 1899.)

FEW things show more clearly the advance made in the practice of medicine within the last thirty years than the way in which the diseases of children are now regarded as compared with the place assigned to them a generation or so ago.

It was thought then that to attend to the common ailments of women and children, those of children especially, was work that scarcely demanded the preparation of a complete medical curriculum. Even a professor of medicine at one of the leading universities had the courage within living memory to say publicly that a two years' course would be quite enough for successful practice "among women and children."

Nowadays all this has changed. It is universally recognised that the physiology and the ailments of men are not a whit more intricate than those of women, and that both are simpler than those of children. To treat young children successfully requires, not only all the training and knowledge every good practitioner ought to posess, but important additions. Some of these additions, moreover, are natural gifts which cannot be acquired by any amount of training or patience. To be able to read a child's nature easily is as much a gift as a fine ear for music. Some men and women have it, and many more are completely without it. To succeed as specialists in children's ailments it is essential not to be without it.

The work before us is intended mainly for students, and one of its aims is to show them how and what to observe. A large part of the book is concerned with the physiology of growth, of nutrition and of the nervous system. Many of the illustrations are specially good.

The sections devoted to the study of diseases of the various systems, digestive, circulatory, &c., suffer from the condensation necessary in a work of this size. It is a hopeless business to try to make pemmican attractive. But, on the other hand, pemmican has its uses, and a book small enough to be carried to the bedside in a hospital ward will often help a student more, for a time, than larger and more interesting works could do. These he will read later and with a mind more ready to appreciate them.

Fowler and Elder's manual will not displace Ashby and Wright's on the same subject, but it is a sound and trustworthy guide in a difficult department of medical practice.

Analyses Électrolytiques. By Ad. Minet. Pp. 170 (Paris: Gauthier-Villars, Masson et Cie, 1899.)

THIS handy volume, which appears as one of the "Encyclopédie scientifique des Aide-Mémoire," affords another indication of the continually increasing application of electricity to chemical analysis. About a third of the book is devoted to the description of apparatus used in electro-chemical analysis and to general considerations of a practical and theoretical nature. The latter contain certain inaccuracies which indicate that the author is not conversant with the advances made during the last decade, in regard to our knowledge of the nature of salt solutions on the basis of the theory of electrolytic dissociation.

The second and third chapters deal respectively with the analysis of metalloids and with the quantitative determination of the metals when present in solutions free from other metals. The fourth chapter treats of the separation and determination of the metals in a mixture; while the last is devoted to a few technical applications, such as the analysis of industrial copper, of bronzes, and of brass.

The practical portion of the book is clearly written; but on account of the lack of details in the case of a considerable number of the analyses, the book can scarcely be recommended to electro-chemical students for use in the laboratory.

Essais des Huiles Essentielles. By Henri Labbé, Ingénieur-Chimiste. Pp. 187. (Paris: Masson et Cie.)

THIS neat little volume, which forms part of the "Encyclopédie scientifique des Aide-Mémoire," published under the direction of M. Leauté, is intended as an introduction to the analysis of essential oils, substances which, according to the author, are very liable to adulteration.

The directions given for analysis are too general and brief to be of real utility to the practical analyst, but the properties of the pure products, compiled from Schimmel and Co.'s publications and from other trustworthy sources, are carefully tabulated, so that the book will at least be serviceable for purposes of reference.

Chemistry for Organised Schools of Science. By S. Parrish, B.Sc., A.R.C.S. With Introduction by Dr. D. Forsyth. Pp. xiv + 262. (London: Macmillan and Co., Ltd., 1899.)

THE course of experimental work described in this volume is designed for students in Schools of Science of the Department of Science and Art during their first two years of study. It is the outcome of experience, and represents the work which pupils from thirteen to fifteen years of age can do and understand. Following the reformed plan of teaching chemistry, the course begins with simple chemical manipulations, weighing, solutions, distillation, the preparation of common gases, composition of water and air, formation of salts, carbon and its oxides and a few organic compounds. In the second year's course easy quantitative experiments are given, and attention is paid to the laws of chemical combination, symbols, formulæ, &c. The halogens, sulphur and its compounds, the estimation of volume, are among other subjects dealt with. The test-tubing exercises, which once formed the chief part of the work of the student of elementary chemistry, are omitted altogether; and in their place we have a rationally constructed course of work, in which the intimate relation between chemistry

and physics is brought out. The pupil who is fortunate enough to receive instruction on these lines will be placed in the receptive intellectual attitude which should be the aim of all scientific education.

Natural and Artificial Methods of Ventilation. Pp. 66 + xvi. (London: Robert Boyle and Son, Ltd., 1899.)

THERE is a considerable difference of opinion among experts as to the most satisfactory system of ventilation. The system by which fresh, warm air is forced into rooms at the top while foul air escapes at the bottom has been introduced into a number of buildings; but the compilers of the present volume give extracts and diagrams from papers and reports to show that this method is wrong in principle, and inefficient in practice. It is held that the heating of a building should always be separate and distinct from that of the air supply, and that the only satisfactory means of ventilation is obtained by extracting the vitiated air near the ceilings of rooms, and admitting the fresh air at lower levels. This "natural" system has been successfully introduced by Messrs. Boyle into several public buildings.

Man, the Microcosm. Part I. The Nature of Man. By Leonard Hall, M.A. Pp. 82. (London: Williams and Norgate, 1899.)

DEFINING a monad as any living organism which consists of only one cell, the author's thesis is that man is a community of monads, each of which is a conscious being, and that "human consciousness must consist of the combined and co-ordinated consciousness of the individual monads." The theory is used to explain many facts concerning the nature of man as an individual and as a member of a social community.

The Reliquary and Illustrated Archaeologist. Edited by J. Romilly Allen. New Series. Vol. v. Pp. 288. (London: Bemrose and Sons, Ltd., 1899.)

MANY articles and notes of interest to all students of archæology are contained in this new volume, comprising the four quarterly numbers issued during the present year. The numerous illustrations of places and objects of archæological significance add to the attractiveness of a volume which appeals to every one interested in antiquities.

LETTERS TO THE EDITOR.

The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. *No notice is taken of anonymous communications.*]

Botany and the Indian Forest Department.

IN the issue of NATURE of this date I find the second part of Sir G. King's presidential address of Section K, Botany, delivered at the Dover meeting of the British Association. At the end of that address Sir G. King has made a strong attack on the Indian Forest Department, and on the teaching of botany at Coopers Hill College. He maintains that the forest officers trained in this country go out to India with an insufficient knowledge of systematic botany, and that they, on arrival in India, are not encouraged to familiarise themselves with the contents of the forests under their charge.

These assertions are in some respects not in accordance with the facts of the case, and in others they show that Sir G. King, in spite of his long Indian experience, has failed to grasp the real issues. I trust you will permit me to substantiate these two points.

To begin with, Sir G. King puts the cart before the horse. If, as he maintains, the ordinary forest officer educated in England now arrives in India without sufficient knowledge to enable him to recognise from their botanical characters the most well-marked Indian trees, it is chiefly due to the fact that it is nowadays almost impossible to secure a botanical teacher in this country who can impart the necessary knowledge to the students. Sir G. King feels this himself, hence his lamentations, at the end of his address, over the decay of the study of systematic botany in Britain. I feel sure that Sir W. Thiselton-Dyer will bear me out when I state that no botanical teacher has been appointed to Coopers Hill College except with his, and latterly also with Dr. D. H. Scott's, advice. They have been good enough to recommend to us the gentlemen whom they considered most suitable for our requirements, but, alas! not one of them, though all were excellent and even famous botanists in other respects, was a systematic botanist in the sense demanded by Sir G. King. Hence I must turn round upon him and say: "Provide well-equipped systematic botanists, and we shall be only too glad to have one of them." In other words, the main difficulty lies with the botanists of the present age, and not with the Forest Department.

On the other hand, we are not free from blame. Until the year 1890 botany was a compulsory subject in our entrance examination, but in that year it was, against my advice, made an optional subject. This, I believe, was due to the influence of the headmasters of our great public schools, who desired to pass their pupils straight into the service, without being obliged to teach special subjects, such as botany. I do not desire to discuss the general question here involved, but I do wish to state that the action in the direction just indicated was decidedly injurious to our special requirements. I am happy to say that during the last year botany has once more been placed amongst those subjects which every candidate for entrance into the forest branch of Coopers Hill College will have to take up.

As for myself, I may state that, ever since I started the forest branch of this College in 1885, I have constantly urged our botanical teachers to extend the study of systematic botany at the expense of other branches, such as physiology. But what with young men trained on the ordinary lines of our public schools, and with teachers with a decided leaning to branches of botany other than systematic, it has been a hard struggle. The otherwise excellent teachers of botany, whom we have had so far, did their best to take up systematic botany on the lines required by us; but that is a branch not learned in a day, and the first two of our botanists left us, for better appointments than we could offer, when they had fallen in with our requirement.

And yet I think Sir G. King goes too far when he states that the ordinary forest officer educated in England is unable to recognise from their botanical characters the most well-marked Indian trees. Cases like this do, no doubt, occur; but I am sure that Sir G. King's assertion does not hold good in the case of many of the men who have been sent to India. Indeed, several of them have developed a decided leaning towards systematic botany. At the same time, the task is, in a great part of India, far more difficult than would appear from Sir G. King's words. I should like to know what he understands by "the most well-marked Indian trees." There are some 4000 different species of trees and woody shrubs in Burma, and about half that number in Bengal-Assam. If Sir G. King expects our forest officers on arrival in the country to recognise even a moderate fraction of these species, then he aims at impossibilities, and his enthusiasm for systematic botany has carried him far beyond reasonable limits. To do what he requires demands a thoroughly trained botanical specialist; and even such a one would require many years to become acquainted with the trees, shrubs and herbs (as demanded by Sir G. King) of an Indian jungle in Burma, Bengal and many other parts of India. For such things the ordinary Indian forest officer has no time.

The statement made by Sir G. King, that the young forest officer on arrival in India is not encouraged to familiarise himself with the contents of the forests under his charge, is not in accordance with the facts of the case. On the contrary, it is made the first duty of the young officer, apart from the study of the language of the people. Sir G. King himself enumerates fourteen forest officers who, during the last thirty years, have done good botanical work. Of these, five have made important contributions to the systematic botany of India. Of the other nine, one was trained at Coopers Hill. Considering that all the men sent out from Coopers Hill are as yet young, and that to my certain knowledge several of them are likely to become botanists, I think Sir G. King's strictures are not justified. Unfortunately,